

REMARKS

Claims 12-30 are pending in this case. Claims 15-26 have been withdrawn from consideration as being drawn to a non-elected invention.

Claims 12, 13 and 14 have been amended in order to more particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Claims 27-30 have been newly added, in order to further define the invention.

Support for the claims, as amended, is found throughout the specification and claims as originally filed. Specifically, support for the recitation of "150 ppm" in claim 12, is found in the specification at page 4, line 22.

New claims 27-30 find support in the specification at page 4, lines 18-20 and 21-22.

The Applicants respectfully submit that no new matter has been added. This Amendment is fully responsive to the Office Action dated **March 3, 2004**.

In view of the amendments to the claims, new claims 27-30, and the remarks set forth below, further and favorable consideration is respectfully requested.

I. Claim Rejections under 35 USC §112:

Claim 12 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Responsive to the Examiner's rejection, claim 12 has been amended to clearly set forth that the subject gas has a purity of at least 99.9 % by volume. In view thereof, it is submitted that claim 12 is clear and definite within the meaning of 35 USC § 112, second paragraph. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

II. Claim Rejections under 35 USC §103:

Claims 12-16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada et al. (U.S. Patent No. 6,465,359 B2).

The Examiner states that it would have been obvious to the skilled artisan to employ a gas comprising a total content of nitrogen gas and oxygen gas, contained as trace gaseous ingredients of the remainder, being not larger than 200 ppm by volume (claim 12) and having a moisture content of not larger than 20 ppm because Yamada suggests that a high purity is desirable, and that the skilled artisan would be motivated to obtain the highest purity possible.

Yamada is directed to an etchant for use in a semiconductor processing method and system, where the etchant includes C₅F₈, a carrier gas, and one or more of CO and O₂. Yamada requires a carrier gas, including for example, Ar.

Applicants note that claims 15-16 have been withdrawn from consideration.

Yamada is silent regarding other gas components of the C_5F_6 gas, and is silent regarding the content of any such other components, i.e., nitrogen and oxygen.

The presently claimed gas for plasma reaction requires octafluorocyclopentene (C_5F_8) having a purity of at least 99.9% by volume, and the total content of nitrogen gas and oxygen gas, contained as trace gaseous ingredients of the remainder, is not larger than 150 ppm by volume.

The difference between the present invention and Yamada is that, first, the present C_5F_8 gas is ten times as pure as Yamada, i.e., the present gas has one tenth the impurity content as does the C_5F_8 gas component of Yamada (that is, the C_5F_8 gas component of Yamada contains 10,000 ppm of impurities, other than C_5F_8 , at maximum, but, the C_5F_8 gas used in the present invention contains 1,000 ppm by volume of impurities at maximum); and, secondly, Yamada is silent regarding the content of oxygen and nitrogen in the C_5F_8 gas component. Applicants note that the present high-purity C_5F_8 gas requires a total nitrogen gas and oxygen gas content of not larger than 150 ppm by volume.

Applicants submit that the C_5F_8 disclosed in Yamada is problematic because, during the production process, when the C_5F_8 is treated in a liquefied state at a temperature below the boiling point (27°C), air (that is, nitrogen gas and oxygen gas) and nitrogen gas within the production equipment are rapidly dissolved in the C_5F_8 and the total content of nitrogen gas and oxygen gas dissolved therein reaches, for example, a value of 500-700 ppm at 20°C . Furthermore, such C_5F_8 gas is problematic in that when liquid C_5F_8 is stored and removed from the storage tank in a gaseous

state, the amount of nitrogen gas and oxygen gas in the gaseous C_5F_8 varies greatly with time. Please see page 6, first and second full paragraphs of the specification, which discuss JP-A-H995458.

When such C_5F_8 gas (discussed in the preceding paragraph) is used for dry etching, high selectivity to the material to be etched and a high etching rate are not obtained because: (i) various etching species are produced, which variable species negatively influence the plasma reaction; (ii) because, when the content of nitrogen exceeds a certain level, a plasma reaction of C_5F_8 is shifted from decomposition of radicals to polymerization thereof, thus producing an undesirable polymer deposit; and (iii) because, when C_5F_8 is taken from a vessel, the amounts of volatilized nitrogen gas, oxygen gas, moisture and other ingredients vary greatly with time, and therefore, it is difficult to stably conduct the plasma reaction under constant conditions. Please see page 7, lines 6-23 of the specification which discusses JP-A-H995458. Please note that the C_5F_8 gas component of Yamada has a purity lower than that (purity of 99.8% to 99.98%) of the C_5F_8 gas as disclosed in JP-A H9-95458.

In contrast, the plasma-reaction gas of the present invention where the total content of nitrogen gas and oxygen gas is controlled to an amount of not larger than 150 ppm by volume, does not have the above-mentioned problems.

The Examiner's position appears to be that Yamada suggests that high purity is desirable, and therefore, one of ordinary skill would be motivated to obtain the highest purity possible.

Applicants submit that the present C_5F_8 gas having a very high purity and a total content of nitrogen gas and oxygen gas of not larger than 150 ppm by volume, was not known or suggested as

of the priority date of the present application (this high-purity C_5F_8 gas can be produced by the process disclosed and claimed in claims 15-26 of the present application), and further that the above-mentioned benefits of the present plasma reaction gas are obtained with such reduced total content of nitrogen gas and oxygen gas, as well as by the present very high purity.

In conclusion, Yamada '359 does not suggest a C_5F_8 gas having very high purity and including a total content of nitrogen gas and oxygen gas of not larger than 150 ppm by volume, as presently required by claims 12-14 and 27-30.

Further, regarding claim 27, claim 27 recites the transition language "consisting of", thereby excluding any additional elements.

In view of the amendments to the claims, the new claims and the remarks set forth above, it is submitted that nothing in Yamada, suggests the claimed invention within the meaning of 35 USC § 103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

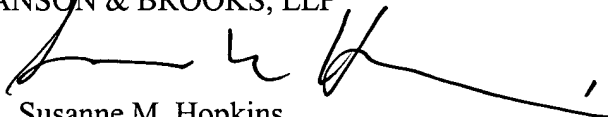
In view of the aforementioned amendments and accompanying remarks, claims 12, 13 and 14, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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